

Exposure:

Regulatory agencies and other organizations like the JMPR (FAO/WHO) model dietary and/or occupational and/or residential exposures and have determined large margins of exposures.

Rather than rely on modeling exposures, a recent publication by Germany Federal Institute for Risk Assessment (BfR) describes a critical review and comparison of data obtained in a total of seven studies from Europe and the US (Niemann et al., 2015) where traces of glyphosate were found in human urine samples.

The BfR is the Rapporteur Member State conducting the review for the European Commission for Annex I Renewal for glyphosate and they concluded:

- **All measured values, even the highest, were of no health concern. The calculated human exposures were at least one order but mainly two or more orders of magnitude lower than allowable daily intakes and allowable operator exposure levels.**

Human exposure to glyphosate can occur via the diet and application of glyphosate-based formulations for vegetation control (residential and commercial). According to the American Council On Science and Health in "BIOMONITORING: Measuring Levels of Chemicals in people – and What the Results Mean," such surveys run the "risk of misinterpreting the data from these programs." "Perhaps the most common misperception is that the mere detection of a chemical in our bodies suggests a health hazard rather than simply providing a measure of exposure."

Regulatory authorities and the JMPR establish an allowable daily intake (ADI) to account for these exposures. So it is not surprising to see traces of glyphosate in human urine samples. Because glyphosate is not metabolized, does not bioaccumulate and is excreted unchanged in urine, measuring urine levels can provide reliable estimates of actual internal human exposure.

Other conclusions by Niemann et al:

- current analytical techniques allow the detection and determination of trace amounts of glyphosate in human urine more today than in the past, however the results obtained with different methods do not differ much and, to some extent, confirm each other,
- findings in human urine may result from dietary intake, residential and/or occupation exposure,
- urinary concentrations tend to be higher in applicators compared to the general public,
- by far the highest concentration was measured in the Farm Family Exposure Study (0.004 mg/kg/day),

To put the value of 0.004 mg/kg/day into perspective the allowable daily intake (ADI) set by the US EPA is 1.75 mg/kg/day, 1.0 mg/kg/day by the JMPR/WHO and 0.5 mg/kg/day BfR. It should be noted that the JMPR/WHO in 2004 raised their ADI to 1.0 mg/kg/day from 0.3 mg/kg/day and the BfR 2015 raised it to 0.5 mg/kg/day from 0.3 mg/kg/day from the one established with the Annex 1 listing in 2002.

The WHO (2005) in its WHO Guidelines for Drinking-Water concluded "Because of their low toxicity, the

health-based value derived for AMPA alone or in combination with glyphosate is orders of magnitude higher than concentrations of glyphosate or AMPA normally found in drinking-water. Under usual conditions, therefore, the presence of glyphosate and AMPA in drinking-water does not represent a hazard to human health. For this reason, the establishment of a numerical guideline value for glyphosate and AMPA is not deemed necessary.”

References

Niemann L. C. Sieke, R. Pfeil, and R. Solecki. 2015. A critical review of glyphosate findings in human urine samples and comparison with the exposure of operators and consumers. *Journal of Consumer Protection and Food Safety*. Published online: <http://link.springer.com/article/10.1007/s00003-014-0927-3/fulltext.html>

World Health Organization (WHO). 2005. Glyphosate and AMPA in Drinking-water. Background document for development of WHO Guidelines for Drinking-water Quality.